

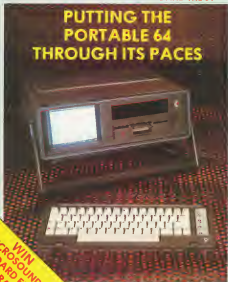
# Commodore HORIZONS

**The independent Commodore magazine**

75p March 1984

ROBOTS COME TO TOWN ● STAR GAMES TO PLAY  
CUSTOM CHARACTERS ON THE VIC AND THE 64

## PUTTING THE PORTABLE 64 THROUGH ITS PACES



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## Business and school packages

SEARCHING for a new software title, or the shortage of software titles for the Commodore machines, a number of companies have developed new business and educational packages.

**Audiotape** has introduced **Manager**, a cartridge-based program with disk back-up which provides a complete database for making lists, managing stock, control sales orders and so on. At £69.95 Manager is designed for small businesses wishing to take advantage of the 64's large memory.

**Wordcraft 40** Audiotape's second release, is a word processing package also on a cartridge. It can be used with disk or tape files and varies with many Commodore compatible printers.

**Micro-File** Micro De-Bug are releasing a range of educational software for the micro-processed Via 20. At £24.95 each the programs include available resources in Physics, Maths, Biology and other scientific subjects, at a variety of levels from 11 plus to O level.

## Designing your own games

**GAME KIT**, Software Inc. has released a Games Design program for the micro-processed Via 20.

After demonstrating the potential of the program with three games, **Blips**, **2x2x2** and **Letter Mixer**, Games Design offers the user to create his own (unlimited), background, music, sound effects and game play in order to create original games.

**Calculus** explains that the Via 20 version of around £4.95 has been released for

to create the widest possible user market.

A revised version for the C64 is at about £10.95 and soon to be available, followed by a disk version (the price of which is not yet fixed).

Games Design is intended for the user with no previous programming experience. It comes complete with an instructions booklet and provides an easy program. Any of the games provided on the computer can be modified or new games can be built up

from scratch.

**Galaxy**, Software Inc. offers users to submit games created using their program for an assessment of their commercial potential.

Like the Quill, an adventure device from Galah and Quill's is a game designer for the Sinclair Spectrum. Galah's program gives you valuable programming as pointed in the hands of the user's representative user. A full screen is scheduled for the new release.

## Games for all tastes

**FEATURING** in the latest issue of games program for the Commodore 64 are a variety of music and education style games designed to satisfy all tastes.

**Terminal** Software has released **History**, a fun action game set in a maze. Mounds of your space fighter is controlled by joystick or keyboard, and the program is fairly well demonstrating.

**Galaxy** Design, also from Terminal, is a version of the arcade laser-painter **Lunar Warrior**. Again it features great graphics and is a choice of joystick or joystick control. The game cost £1.95 each and come in Terminal's box with further promotional info.

In comparison to these, **Spot** based **Prokoff** has announced the release of the more down-to-earth football management game **The Best**. This 13-screen program comes loaded with a seven page rule book, booklet which advises you on how to manage your club, a team list and tell players, and much more on other teams.

At £19.95 **The Best** should provide hours of diversion. Next, did to emphasize the point **Prokoff** gives a free game saving tape with each program.

**Meridian** Publishing has made an entry into the increasingly popular "bookware" field in which a variety of educational

programs is sold with an accompanying book. At £19.95 per pack, the first release is **My Secret File**, described as "a personal database for your darling daughter". It's aimed at the 7-11 age group and is based on a first writing children's paperback.

From Audiotape comes **Hi-Mex**, a version of the popular music novelty **Q-Bert**. This jump from left to right on a three dimensional platform changing the colours of the cubes, but unlike the original on Hi-Mex the cubes change colour again once you land on one.

Hi-Mex costs £6.95 and is available only on cassette for the Commodore 64.

## Three inch disk drives on the way



ITT's 3.5 inch 386 Drive 500 drive with a diskette.

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## All go on software front

ON THE software front, the announcements of the new C64 series has been accompanied by details of a wide range of business games and education programs.

For the Vic 20 and Commodore 64, the Education series, which will total two dozen programs, is a set of double program packs aimed at the 7 to 12 age group. Each program plays as a game, but often presents in areas such as addition, visual problem solving and shape differentiation.

The Reader Assistant series is aimed at the 4-6 age group, and consists of five C64 set titles, each with five major programs and four reading programs.

Talking software using the new Mega Voice module includes two arcade games, Carl and Wizard of Woe, and two more education programs, A Bee C's and Counting Bee.

For the serious word processor, C64 will be making available Commodore 64 and 64k versions of the "pioneering" system Micro Illustrator. Page turns are controlled by touch or lightpen, with the 64 version using 16 colours and the 64k version utilizing all available 32 colours.

Infotrac Desk 1, for the 64, is an integrated text editor, spreadsheet, file manager and calculator for business. It uses icons — small illustrations — rather than text commands to guide the user.

Most interesting for the dedicated game player will be the Quick MediaVision series. Commodore software president (by Harman) explained: "The designator is reserved for a special category of older new games that have advanced computer graphics as well as play areas that use thought and strategy."

The Gold Medalion series has kicked off with their national Soccer, to be closely followed by a version of basketball and a series of educational games.

Commodore UK expects to see most of the 64 series software available here in time for the launch in mid-Summer.

# Unwrapping the new systems

THERE WAS little new hardware to see at the Las Vegas Consumer Electronics Show, apart from Commodore's 264 and 264k models.

Eighteen machines based around the 7601 processor, the two models are meant to complement the C64 64 rather than to replace it.

With full 64K memories, separate-style keyboards and optional built-in software, the models were described at the January show as applications computers rather than mere desktop or game machines.

The 264k additionally features a voice synthesizer with a 128 word vocabulary.

Aimed at the small business user, the most impressive feature of the new machines are the screen window facilities and the optional built-in software.

The "3-plus-1" package will be available either as a upgrade kit for the C64 64 and the 264 and 264k or built-in to the 264 model. It consists of a word processor, electronic spreadsheet, file management program and business graphics facility.

Additionally, the machines



The 264k is the only one of its size

feature four expansion, function keys, eight programmable function keys, and a HELP function.

Although most C64 64 and Vic 20 peripherals should be fully compatible with the 264 series, most software will not be. The 264 series uses an extended Basic with over 75 commands.

The more systems models will also be available as an add-on for the Commodore 64. Voice speed can be adjusted to

slow, normal or fast, and there will be additional to the range of keyboards and types of mice, both on disk and on cartridge.

The 264 series, with its accompanying software, is expected to be available in the country in mid-Summer.

No details of price are yet available, but Commodore will have to consider the challenges posed by many others, the new IBM Sinclair QL, before deciding what would be the appropriate price range.

## Tramiel takes a pew

JACK TRAMIEL, founder of Commodore, unexpectedly stepped his post as its chief executive and president earlier this year.

His departure is connected to the company which he built up through a combination of good business sense and timing.

Irving Gould, Commodore's chairman, announced that Jack Tramiel's departure would be Marked P Smith, president of Tencore Instruments Inc, a company more noted for its packaging and electronic components than for its computers, with more com-

puter sales of 100. Jack Tramiel's 25 years at head of Commodore were marked by his innovative style of management, and a remarkable rate of company expansion from its beginnings as a Consumer typewriter repair company. Commodore has grown into an international success, holding 40% of the world market in typewriters and achieving sales of \$100.

It is thought that it's the very success of Commodore which has forced Jack Tramiel out. Many shareholders are reported to be unhappy with the individual style of management in the light of Commodore's increasing importance in

the world market.

The selection of Marked Smith by Irving Gould — who is himself Commodore's largest shareholder — seems to confirm this.

Last year a new general manager of IBM UK, was appointed — Howard Sam with a former managing director of Unisys Games.

These appointments suggest that Commodore is determined to open its top executive positions by changing its management style in place of the individualism of Jack Tramiel's tenure. We should now expect to see a more consistent line of Commodore.

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## Widen your Scope

**SCOPE** is a comprehensive program language developed by ISP which enables you to use machine code without a computer. After initial selection with the Spectrum version ISP have introduced a CBM 64 version which should be ready by late March.

ISP marketing director Graham Lewis said that the program will suit almost all 64, and will come with a fully

ready to use (extended) Spectrum version.

Scope uses a methodology of 40 simple editing commands entered into machine code to control graphics, movement and sound generation. All instructions, based on ASCII, are 11 bits. The program is already being used within business as a means of creating spreadsheets for the control of money.

Graham Lewis pointed out the great capabilities of the 64 together with the difficulties in programming complex and detailed graphics on the machine make a lot of sense. Scope program — it should certainly be even more moving on the Commodore 64 than on the Spectrum. He added:

## CBM printers make their debuts



The MPS 400 — an impact dot matrix printer.

**COMMODORE** is replacing the current 1525 dot matrix printer with the budget priced MPS 400.

At £250, the MPS 400, which also fits well with other Commodore 64, is the CBM 64 would be suitable for business applications, such as, accounting and label printing, while remaining affordable to the home user for program listing or letter writing.

The MPS 400 can reproduce the full alphanumeric set and the complete range of Commodore graphics characters. In addition the user can designate unique symbols tailored to his needs.

With a print rate of 150 characters per second the MPS 400 is fairly slow. However, it offers some useful features, such as horizontal and vertical address movement, double width printing and white on black printing, both

of which are useful in document presentation.

Paper width is up to 10.5 inches or 12 inches including the margin lines for the pre-form documents.

The 4200 gross top includes VAT and the necessary links to connect the printer to the serial interface system on the CBM 64 or 128.

■ As announced at the IFA Show in 1984, the MPS 1024 laser printer, which accepts Triumph Adler standard wheels. Special characters can be obtained with optional print wheels and maximum paper width is 12 inches. No great depth were available at the time of writing.

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# Mastercode Assembler

## for the Commodore 64

Full Commodore 64 Assembler/Disassembler



**£14.95**

Mastercode is a substantial and complex program of use to anyone interested in writing machine code on the Commodore 64.

**Its features include:**

- Machinecode monitor
- File Editor
- Disassembler
- Assembler

Mastercode is a full two pass assembler. It does not label variables and equations within assembly language programs. It is possible to store programs anywhere in memory, even in parts occupied by the Assembler. Programs can be saved to either tape or disc.

**The Machine Code Monitor includes:**

- LISTING OF MEMORY IN SCANNED BYTES ■ MEMORY ADDRESS MENU ■ EXECUTION OF MACHINE CODE PROGRAMS ■ VIEW OF MACHINE CODE BYTES ON 16, 32, 64 OR 128 BYTES ■ CHANGING OF MACHINE CODE ON FILE, AT TAPE OR DISC ■ STEP BY STEP TRACKING OF THE EXECUTION OF A MACHINE CODE PROGRAM ■ INCLUDING DISPLAY OF REGISTER CONTENTS

The Disassembler will translate into assembly language the contents of any area of memory, whether the 64K ROM or a user program. Output may be sent either to the screen or a printer.

**The File Editor includes:**

- ENTRY OF NUMBERED LINES OF ASSEMBLY LANGUAGE INSTRUCTIONS ■ LISTING INDIVIDUALLY OR IN BLOCKS OF PREVIOUSLY ENTERED LINES ■ LISTING IN NUMBERED LINES IN BLOCKS OF EXISTING LINES ■ RENUMBERING OF EXISTING LINES ■ CHANGING OF LINES IN BLOCKS OF EXISTING LINES TO TAPE OR DISC ■ SAVING OF ASSEMBLY LANGUAGE WITH PROGBYTE, LABYTE ■ MOVING OF A BLOCK OF MEMORY SPECIFIED BY THE USER TO THE USER ASSEMBLY PROGRAM

The Assembler allows the translation of assembly language programs into machine code with full error checking, labelling and a range of assembler directives.

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# Neoclyps rules

Pete Dierard looks at the latest games for the Vic and 64



A MIND BLOWER from this month from a variety of different suppliers. At the end of it all, the only conclusion you can make is that the same company is probably capable of producing a devastating game, too much, and is willing to deliver the best.

To get the ball rolling, let's take a look at one game in the games currently available for the Commodore 64.

Barrel, here...over the years produced some excellent games for the Vic 50 and then here, crop of releases for the Commodore 64 there, as a number of games. Not least of these is *Barrel Triumph*, a two-player space game which promotes over 25 billion game variations within the same 64-W program.

Any company that can make a board like that deserves to have its software examined more seriously than most and *Barrel Triumph* lives up to its billing. *good?*

The scenario is nothing new, a battle in the depths of outer space. The two players also share means that you'll have to find another space war to play the game with, as unfortunately there is no option to play against the computer.

Both of you are in command of little space ships that shoot about the screen, firing off a fusillade of death missiles at each other. The battle takes place in the left two-thirds of the screen, while the right hand portion is used for displaying useful things like the score, the amount of time left and so on.

The time factor is just one of the many options that can be changed. In the centre of the screen you can choose to have a moderate mix of you wish or you could have a black hole, or simply nothing at all, which looks remarkably like having a black hole.

The black holes in *Barrel Triumph* are distinct from the usual ones believed to exist out in space, as they can be given a negative gravity if required. Other options include the speed at which you shoot, the type of missile your ship will have, and even the type of universe that you want to play the game in: now there's goodness. Eight options are already built in and are activated at the end of each game by pressing one of the function keys, rather tedious in our opinion.

To conclude, if you have two good

and two mother's (but) that's better than almost (but not as) better, this game will give you a worthwhile value for your money.

Back to one player and one joystick for *Quantum Leap* (Voyager Software) although when playing the game the quantity and responsiveness of the joystick.

According to the blurb you are in control of the most sophisticated space fighter yet conceived, and your mission is to destroy the Etrian rocket base on the planet Hagon. Eric, as usual, is made just that little bit more difficult by the inclusion of a number of deadly traps in the form of three different types of mines.

On the first screen all the action occurs more than a mile to the right, as you are down a tunnel trying to dodge and shoot the enemy coming towards you.

## SOFTWARE REVIEW

*Quantum Leap*, an graphics allows your spaceship (arrow, light) to do more than simply dodge from left to right at the bottom of the screen. Shooting the joystick in the appropriate direction allows you to bank your fighter and the shadow in the map left in your screen shows the plane after, accordingly.

Surviving that lot takes you onto screen two where you have many more and methods to dodge in as well as the obligatory mine. Again, some lovely graphics are used as people at last begin to get the hang of programming the 64.

The third collection of mines is probably the most difficult of the lot to defy, and some seriously horrible brown mountains come towards you in a very good impression of three dimensional graphics. After this the game follows the same format of dodging and evading back to the first screen, with everything getting much faster and much more intense.

If you can afford to wait about half an hour while the game loads your space that long but it seems like it will be rewarded with a game to keep you the most intense of arcade action quest for a little while. Remember, the bar of the screen runs on your joystick.

*Quantum Leap* is an old hand, and fall neatly into the category mentioned in the case of the review of home computer

games, the first software rule, and the, so to the end. And I think that's it. This is very well, is a difficult one?

The scenario will be familiar enough to anyone who's played computer games before and in particular those jerky Spectrum owners who've played the marvelous *Mines*, *Mines*. The plot of *Quantum Leap* follows roughly the same line, and it's hard to prove a company who simply copy other people's ideas.

You are really the mine, and it's your task to exploit the old mine mine found deep in the heart of Etrian. There are thirty different mines in the mine to explore, and each one is occupied by a differently odd set of traps. As well as exploring mines, you have to keep your ship's health along computer logic, because of those that collapse underneath you and collect a number of resources on each screen before leaving by jumping into a big loaded mine, back to the screen.

The mine mine, this mine, are all very familiar marksmen of popular computer game scenarios. There are no mine mine on legs, a lot of heavy mine, from the 64 game *House* (the mine mine) Jeff Miner part in an appearance first on in the game, the well-known mine mine game character *Horizon* is also in there somewhere, and on every level you'll find something that is familiar.

A good idea for a game, certainly, but regrettably it's all been done before, and done a lot better in the original Spectrum game *Mines*. *Quantum Leap*, it seems to have been written in slow old mine and so it's rather happens at speeds more subtle to mine than *Quantum Leap*. Finally, the mine of the mine will have you waiting for the volume control on your TV set when seconds of mine the mine.

Sorry *Interceptor* it was an original game a while ago, but it's not a game who want a version of *Mines* *Mines* for their machine might it will wait until the original program is converted.

As with *Interceptor* game, there are mine mine from *Quantum Leap* to provide, and the mine mine of mine can certainly reveal the most useful of mine. However, from the mine, back to it if it should be a three dimensional game version of mine thing. The mine, however.

It's not quite like that.

With the option of using either a joystick or the keyboard, the action takes place at a maze divided up by various blocks around which you and the enemy must move your ships in an effort to destroy each other.

The motion of your ship is easily controlled. Increasing the power in one direction increases the speed of the ship in that direction up to a point, level, and releasing the stick allows you to slow down gradually to a halt again. Firing is done reasonably enough with the fire button, but that appears to suspend all other movement until the missile either finds its mark, as happens frequently, and the side of the maze.

If you miss, your score for each shot has a decrease by one point, from a base score of 20 on screen one, 40 on screen two, and so on.

Score half-downs alone act after you to begin with, and journeying through the levels merely increases their speed rather than their number. The last enemy ship on each level creates one to drop from the level level, at least you get time to adjust to its new speed at which everything will start to happen.

Deploying a level of intelligent beyond most arcade games, the program starts off by giving you to type in your name. You can be anonymous if you wish, but at least the program realizes that the first person to play the game will inevitably get the highest score.

David Haines, a 27-95 is neither brilliant nor terrible, simply another middle of the road game from a company capable of much better.

#### Well received

Lunar Rescue, by any other name is a real Lunar Rescue, and Sirius Dodge from Personal Software is a poorly designed version of said game. However you become a space or existing arcade game, it is to be done out of hand!

All right and no to this say! The plot from the original arcade game has been changed a little, presumably to make the life of the programmer that much easier when it comes to handling complicated graphics. You start the game at the top of the screen at a motherboard comfortably holding along from left to right and back again.

For before, at the bottom of the screen, there are a number of supply dumps. Your mission is to pilot your interstellar shuttle down the screen to the supply dumps, pick up a few goodies, and get back to the top again.

Dealing with the motherboard is difficult enough as it is, but Terminal have seen fit to copy another memorable feature of Lunar Rescue. Namely, between the top and the bottom of the screen there flows a large number of so-called characters—worms, amoebae, and there are to be needed at all costs.

This is not new, since your shuttle responds to the joystick with the capacity of movement, and communicates on often be sure to be, inevitable, to catch before there are with happen.

Remembering that you've got to pass the game, try to use the joystick, otherwise the game will usually go off into self-destruct mode and you'll have to use the keyboard option. This is a reasonable change at giving Lunar Rescue into a home computer that somehow the game does not match up at all to the original arcade version, and aficionados of the old thing will probably not find too much to like about it.

Quite why the word Super has to appear at the front of a name is little is something that I will never understand. Any game, thus describing itself is simply asking for trouble when it comes to a review, but happen Super Gridlock 27-95 from Personal Software, although associated from criticism. This is one of those mindbogglingly addictive games that make you want to go one more go before going up for the day. Before you know it, one more go has become at least ten more games, and the night begins to wear.

There is no particular reason why the game should be the name, that it is. The graphics are nothing special, indeed they are quite ordinary, and only a few objects serve to form up an otherwise dull screen. The use of sound is primitive, and serves only to annoy the player, rather than enhancing the action.

The plot of the game is completely null. You are on a grid, apparently it's changing out of a space that goes happily to hell throughout the game. The grid forms a couple of stars, which look very like spiders but which are described as long chain ones. Whatever they are they are not to be touched with.

All you have to do is increase the grid, which is made up of a series of horizontal and vertical lines. Any line that you pass once changes colour, and completing a line of coloured lines scores two points. When all the lines on the grid have changed colour you move on to the next level.

Success levels don't increase any more, however, but do have a variety of differently shaped goals from squares with holes in the middle to objects which even Pongsters would have been hard pushed to beat.

Completing eight levels takes you back to grid one again, but with three stars after you this time, and your troubles begin again.

Surprisingly different, this is a very addictive game, and one that goes down, at least of play versus price at certain premises you value for money.

On to Crystal of Zing at 27-95 from Personal Software Services. Confession now! Once this American import, since the cassette cover refers to it as Crystal with a B, while the game performs crystal with a C. Whatever you call it, this is a superb combination of minds to make under a challenging adventure scenario.

There are eight different levels of play, which each level the plot takes place on a time by time grid of same different stars. Depending on which level you're playing, each room is filled with four fixed monsters. There can be other monsters, bats, spiders, or mosquitoes, and the nice graphics do actually





#### 4. *Attack, I'm attacking!*

The idea of this game is indeed a fairly straightforward one. Being, according to the blurb, an old war-torn planet fighter and space war that puts it in your hands to rule the planet. No kidding. I love the revealing borders of old games.

Since *Planetopia* just happens to be one of your colonial planets, you get to be the architect, and set off in your speedy space ship to do battle with these alien war gods. The planet has been split up into four quarters, each populated by a different set of aliens. And there are more than just other planets ready to contend with.

Each quarter has been filled up with a number of solar towers which give you energy, money, and you have to choose the colour of the planet not only of the land you go, but also of the towers, since these serve only to alert the enemy of your presence.

With scrolling graphics going beyond anything I've ever had the let you gaze about the screen looking for aliens and towers. The rest of the usefulness of the planet is a mixture of what look like little black spots, some narrow bays and other second buildings. Usually, the towers are hidden amongst these buildings, also making them difficult to get at.

However, destroying an alien gives you temporary immunity, and if it, then that you must wander down and blast a tower before finally built up over the ships again. Stay about looking in circles with a new tower that it's been set on fire, and another at once. It does disappear. That's life? But, and you'll need every one of them.

This is a great game, and every minute you're with a command, it's almost ready and that it immediately. No, it's just a good command.

Now we go on to consider games for the VIC 20. With a little bit of ingenuity, and a bit of programming skill it is sometimes quite surprising to see what can be achieved with the ungracious VIC 20. Remembering that you can only get about 10K in play with *Shrek Attack*, at £1.99 from Beam, proves that you don't need megabytes of memory in order to provide a good programming and highly addictive command game.

I'm not in control of a whole shooting team that blunders about the screen. Being rather a cynic of the keyboard, it is very hard to fill the screen not despite of the screen, as Beam, would have no below with your set, which opens up before you to you alone.

Needless to say, it is not quite such plain sailing as it sounds. To make your task more challenging, the water in which you are swimming are full of eggs from the eating mouth of fish. Just when you thought it was only to play with a command game, you find yourself being chased by four sharks.

They might not look much like the water's friends, but moving up with one of them is equally difficult, and one of your ship's crew will go should you be unlucky enough to bump into one.

You can turn them with your set, and indeed this is the key, by offering high

scores in this game. But if you don't move for a while, or you spend too long going you will find yourself that you're already covered, the sharks have patience and show their way out.

If you manage to carry a few percentages of the screen with life for land will mean, you move on to the next level. This is everything is more or less the same, but with an important difference. A number of ships have landed the water's depth, and although there don't move around at all, they still represent a considerable obstacle in colliding with one of them. Yet, you cannot in fact pass a life.

And as a result, you will have some ships appearing in each level, and the set is full of the things. You must get lucky and have an opportunity that out one of them, but don't hold your breath.

A good game that makes the most of its ungracious but's limited features.

#### Building along

Another one for the ungracious VIC. *Quantum Leap Beam* describes itself as a three-dimensional game. While the might be described as such, and even to watching the track a little for a bit, the main feeling at this point is the tediousness of the action that Beam have chosen to display everything in. The action is at times quite simply unworkable, and you never get a clue about what is happening. All you know is that if it moves, it's in.

The story-line behind some arcade games may be reaching 200 minutes, of a Space Odyssey proportions, but here goes.

For some time now the planet *Sybil* has been used by its valuable resources of *Beam*, whatever that might be. Recently, however, the evil *Beam* have been attempting to take the planet over with a single secret weapon. You being the star player here that you are, you can't do this with them and instead to this game and the *Sybil*, way of life.

In real life, of course it is easier than this, but it's a game to be, so in this game it is keyboard game the story gets something like this.

You have to guide this little bird along the surface of a planet. Now the local council have obviously not been looking after this planet, since it is littered with more craters than the *M1*, and there have to be jumped over at all times.

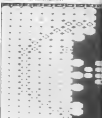
Meanwhile, a wave of odd-shaped objects are lurking about on the stars above, and periodically firing missiles at you. The object of the game is then to avoid all the stars, while saving all the stars. You have control over the speed at which you take this game over, and when to jump and fire.

Seeing off eight waves of these odd shapes, when you come to the other end of the screen, you can level two other worlds known as the *Evil Beam* level one of course being the *Beam* level. Here you're meant to get more stars destroyed, but also this is achieved by the VIC in the end of the game.

And as it goes on from level to level! Not bad, in *Vic* games you can't really do anything about the editor's choice. Also



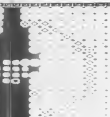
Planetopia — the main screen (VIC)



Quantum Leap Beam — level one (VIC)



Beam — level one (VIC)



for the unrepentant Vic, Atom Smasher — again from Epyx — takes a good 150 minutes to load, as it comes into the machine as three distinct parts. As well as possibly being the program that takes the longest time to load, only an unrepentant Vic could claim to be an award for being one of the more ridiculous video games any game for any computer. But having said all that, Atom Smasher is well worth a place on any Vic. It's a real game fanatic's delight.

You act as the hero of a nuclear reaction, which is heading uncontrollably towards a catastrophic meltdown. In order to delay the inevitable fatal, you are in command of a maintenance team implanted inside the heart of the nucleus. You have to perform all kinds of tasks to try and keep the meltdown at bay.

You can, should you choose, shoot down a proton or two. However, completely the opposite is to move low-level physics, shooting a proton (which is a fairly distinct to glide about the place) there's only one to begin with, so well, in another position. Perhaps all the additional energy, having in mind the law of conservation of mass, is being dissipated from you. For me, it's no mistake, this is a fine action game requiring a firm hand on the joystick.

If you think an electron nothing either able happens, but the meltdown does appear to be possible at a faster rate on however tempting, it may be, it's probably wise to resist that temptation.

It is also wise to avoid running into an electron, since that loses one of your three lives, so well as bringing yet another electron into the game. After a while an electron, well more considerable from the side of the screen, and although you can shoot it, this will move towards faster than you can destroy it, and when it reaches the nucleus the game is over.

Some very nice graphics (especially when you lose the game) and good use of sound make this an enjoyable romp for the unrepentant Vic.

Again, I must disapprove of Epyx's decision to bring a break between an arcade game and an adventure game is perhaps a little misleading. It would be more correct, to call it five inside games rolled into one, since every level requires its own set of the skill and reflexes of the dedicated arcade freak, then it does the thinking mind of the true adventurer.

The new world requires at least 4k of expansion, since there's a lot going on in Zorger's lair. After a war of a few minutes, and the tape system double-duty, you can on the Atari, you return the game proper.

Strangely enough, the first creature you are asked to 'lose many lives do you want', with a choice of from one to six. Since only a fool (or very good player) would attempt to get through all six levels with just the one life, this seems a more sophisticated ball, having selected on how many the game proper.

For the first part of the game you have to climb up a number of ladders, and once along with that you can breathe yourself up at an alarming rate. Also on the way up is a bouncing ball, whose touch means instant

death. If you successfully get to the top of the screen, it is going to leave that you have to do the whole thing again. I know it's in the manual, too, but even so.

Should you succeed, everything stops for a quick agitate while the next part of the game is loaded. When it gets there it is infinitely more complicated than the first part. You have to jump from left to right, avoid falling into, slide down a slope and then finally to end a few seconds until they mutate and you can catch them. Catch two and you escape to level three, and another wait while that is loaded into the machine.

And so it goes on, avoiding organs, pipes, doors, walls and more more hazards before you reach the ultimate level four.

Living all your time hunched back, one means you have to watch the Vic, and on again before reaching the last part of the program. However, that is only a minor complaint against what is clearly a very competent piece of programming, making extremely good use of the graphics and imagination that rather less of sound and overall at 15.95 this is a good buy.

## Pinball software

If like me you need a lot of money on pinball machines, you'll welcome pinball games from Tynesoft Software for the unrepentant Vic 30. What's not to like? The level of the real thing, this program truly feels hard to be a true Pinball Wizard.

Of course it is too much to expect of any computer simulated pinball game that you can ever get the feel of a real live pinball table. But to the others who simulations of one armed bandits also tell about of the mark, there is something about the mechanical side of life that fascinates so many people about these two particular machines.

Well, if it wasn't well known or later turned up on a computer, and this is a better example than most, and it also has the sound of running on the unrepentant Vic 30.

On completion of loading you can opt for either a one or a two player game, and having selected that you have five balls to achieve a maximum score.

The player is pulled back by pressing the 'F' key, and is released by pressing the 'R' key. It would appear to be impossible not to catch the ball onto the table, as even the nearest tap of the key manages to get the ball to escape into the action.

Pulling the plunger back to its full level will always give you a handy bonus into 1 of 1,000 points that count on scoring. The game, and after that you can only control the three flippers, and hope for the best.

There are a lot many things to be hit in the game, although there is definitely enough to keep it interesting. The program manages a more than possible impression, too, of Newton's laws of gravity, and it is always satisfying to watch the points total climbing up in rapid fashion.

Although you haven't the chance of getting a replay, as the option isn't included in the game, these are pieces of bangers and just goes to go for, and if the local economist's attitude has been closed for the night, pinball addicts should find plenty to keep them entertained in this pretty good game. ■

The 22 34 — The keyboard folds up neatly  
to do the 90% of the keyboard work.  
It's all portable inside.

LINE 3

1 2 3 4 5 6 7 8 9 0





# Putting the portable SX-64 through its paces

*Pete Gernard assesses the price of portability on the SX-64 — and its business chances*

SINCE Commodore began its attack on the computer market in 1977 with the very first Pet it's always managed to produce a few surprises.

The V6, 30, when it originally appeared, was hailed as a wonderful home computer. Now, although computer professionals are fond of deriding it as a "disaster", it continues to sell in vast quantities.

The Commodore 64 was seen by most of the experts to be a "mature opportunity," as Commodore's initial Super graphics machine stated facilities, but a truly great version of Basic. Nevertheless, the 64 has also managed to sell in enormous large numbers.

## Sell best

In between these two very popular computers, Commodore tried to create its dominance of the business computer market by launching both the 500 and the 700 series machines. An expensive advertising campaign, and a much-misheard launch that was possibly one of the biggest flops of 1983, couldn't hide the fact that there was simply no demand for them, even if the company could have produced them in the first place.

Never one to admit that it was wrong, Commodore quickly forgot about the 500 and 700 series, and went back to producing even greater quantities of V6, 30s and Commodore 64s.

But somewhere along the line someone must have got cold feet about putting all the company's eggs in the home market. Thus we have the portable Commodore 64, the SX-64, an attempt to regain some ground in the business world, while at the same time retaining most of the features that brought such success to the original 64 machine.

However, it is disturbing to report that Commodore never seems to learn from its mistakes. Other companies, for example Spangol, do at least appear to take some notice of what the rest of the world is doing, rather than repeating all Commodore's mistakes and looking purely at the monthly sales figures.

Machines are refined, innovations are

made, costs are lowered and the benefits passed on to the people who keep these companies in business, namely you. However, Commodore carries on in its own staid way, and the portable 64 is the latest result. Put simply, it is a Commodore 64 with an on-board monitor and a single disk drive, selling at a cost of around £700 in the UK.

The monitor is a slightly 3 inches across, and although there are a number of controls built into the machine for adjusting volume, colour, brightness, and so on, Commodore appears to have left out a timing facility. Thus you either have to live with a very badly focused screen, or open up the computer in the vague hope of finding something to time it with. For the average business man this would not seem to be a great idea.

The disk drive is, predictably, nothing more exciting than a 5 1/4 inch drive chopped up and mounted into a different box. There's 1700K of storage space per disk, and only a single drive is with, although the design of the machine would suggest that there was originally going to be a double disk two drives.

Indeed, the accompanying manual (and Commodore has done a nice computer book series in the company's press series) here also hints at a double drive model called the 64-64, and even has a drawing of it. However, someone close to Commodore has informed me that the machine will never now appear, and we're stuck with the single drive version.

The keyboard, which adds nothing to be the focus of the heat when put into portable mode, has exactly the same layout as the original Commodore 64. But, and it's a very big but, the keys are not provided in the same way.

Commodore may advertise it as a full travelling keyboard, but unfortunately the keys don't travel far enough, and they also have a very "slippery" feel to them. Touch typing would be hard put to achieve their normal speed using this keyboard.

So do the added bonus of a little light on the shift-lock key informing you

whether it's active or not. But I find that this is a small advantage considering all the bad things that have happened to the keyboard.

Inside we find that the portable 64 retains most of the features of the standard Commodore 64. Despite having a disk drive built into the machine, Commodore still seems to have a good old Basic 2.0 as the standard operating system. There is no provision for installing any of the advanced Basic 4.0 disk handling commands such as "Create", "Search", and so on. Instead, everything has to be done the long way by spending time and getting to files. And loading the disk directory so if it were a program it, in own right, is truly dreadful, minus any whatever Basic programs happened to be in memory at the time.

There has been one major innovation made in the fact that the portable 64 does have a disk drive built in. Pressing the shift key in combination with the Run/Stop key now loads and runs the first program from disk, rather than asking you to press play on tape and then loading and running the program.

So how do you load a program from tape then? The simple answer is then you don't. There is no cassette interface anywhere on the portable 64, although some of the software for handling cassette disks still appears to have been missed at 64204.

## Biggie

Commodore claims that, because it's intended to be a business computer, there is no need to have a cassette disk connected up to the portable. But one Commodore employee told me a somewhat different story, about how the machine was developed in Japan. There it seems, they too decided that a business machine didn't need a cassette disk, and simply chopped the appropriate portion off the manual board around the computer.

Realising then that the left them with a lot of redundant software inside the computer's ROMs, they re-wrote a few things so that every time anyone tried to load a program from tape, the message "Illegal program number" would appear. ▶



At the back of the machine there are four ports in total, with including an audio cable connector and a 27-pin port.

#### ■ on the screen

All well and good, but no-one, least of all Commodore in the U.K., knows what has replaced all the ROM code that the Japanese took over. Demand drove these Japanese.

Most people have assumed that the Commodore 64 would be the standard on which Commodore would base its new moves, at least for the next year. Already we have seen that this is not the case, but with the 50-64 it would appear that a first degree of compatibility has been achieved.

All the Commodore 64 disk and cartridge software that I tried worked quite happily on the portable machine, although there were one or two interesting differences between programs.

The popular *Simulator*, a public domain machine code assembler/disassembler for the 64, worked pretty well so long as you remember to change the keyboard colour of the screen before running it. That is purely because the portable stays off with a different background/border combination to the original model.

One program that might have caused difficulties, were it actually taken over the computer in the well known word processor *PaperClip*. However, this move was proved not from a portable to more *PaperClip* linked up to an *Amiga* 1000. At the moment, I suspect, so that too would appear to work without any major problem.

'You'll notice that I used "powered on", not "wakes up".' An 68000 is a fairly self-managing that the machine is going to do the housework of the market. It is that some driver changes will have to be made to the look in monitor, so it is usually preferable to detach read channels on it for any substantial length of time. The display is simply not big enough.

Commodore, quite rightly, points out that the machine can be converted up to a domestic television set, but surely that is defining the point of having a portable computer in the first place?

Although everything that I tried worked quite happily on the 50-64, the story from Commodore is rather different. It would appear that a number of packages, in particular cartridge-based ones, will not work on the new machine. Since, consequently, the much vaunted machine for

the original 64 may not function either. That is a serious let down for a new business machine.

The cost of 1985 does seem to be rather high, when you consider that the cost of a Commodore monitor, a Commodore 64 and a Commodore disk drive is about 1990-50, for an extra 1295 you can get a machine that you can't read a keyboard and uniformly keyboard have the delightful uncertainty of never knowing whether a program will work or not until you try it, and of course the possibility of using tape-based software. It may be portable, it might have a neat design, but for the extra cost I like one would need a lot of persuading.

The lack of a cassette port will probably annoy a few people who, anyway, in making copies of their favourite tape-based programs, so that friends uncomfortable enough to have an 800-64 can use them all on one disk system — on their 1080, disk system, that is. An I/O card, there's no disk, 4 disk commands, no double sided disks (although you can use them if you want to risk it), and no easy way of performing a disk to disk backup without either waiting hours while you swap disks, or accurately mimicking the disk drive.

#### On the brighter side

But there are good points if you look long enough and hard enough.

Of course the stated selling point of the machine will be its portability (24-1 pounds in weight, and fairly easy to carry) once you've got it out of the box that it arrives in, with only one wire trailing about the place on the heavy intelligent 1080 in opposition to the usual rule of two or three cables to be found with most computers.

The price of software that arrives with the computer (especially under £100, which can't be bad, it may be marginally an ordinary financial forecasting package to you and me, but someone somewhere does believe that a really is worth over £100).

Why then, don't Commodore offer us three software, and reduce the price down to a more reasonable 1695? Bearing in mind that that price is still higher than the price of the first Commodore. For a while it was thought, it would be useful to assume that Commodore has got a large backlog of unused software that it wants to get rid of.

All the wonderful sound and graphics

capabilities of the original Commodore 64 are still there fully, not one PCROM, where 30 will do it, and most of the 1080 based software appears to have survived the move intact, unlike earlier machines. It still runs the same programs as the 64, namely the 6145, and most of the other internal chips appear to resemble closely their earlier counterparts.

Although there isn't a cassette port sticking out of the back of the machine, there are still quite a number of other interesting ports there. Underneath the machine is the keyboard connector. The healthy long cable arrives in a hole low off of its axis, and after the first few fumbling efforts it may enough be connected to.

At the back of the machine are 10-pin ports to plug with, including (the really, it is a business machine) two 15-pin high-pin-pin-pin connectors. These are followed by an audio/video connector, a serial port, and the ubiquitous new port which requires a level converter before you can access its RS-232 capabilities.

On top of the 50-64 is the cartridge slot, neatly covered by two little hinged doors when not in use. These cartridges stick out of the top of the computer when being used, but at least you can't forget that you've got one loaded.

According to the people that I've spoken to at Commodore, the common approach to the improving port things of the 50-64. The advantages of having a built-in monitor and disk drive are gone, and at 240-1 pounds it is certainly easy enough to carry the machine about from home to office.

As for its delivery rates, at the time of writing (12th January) there are apparently 800 machines on a ship sailing steadily across the ocean towards the UK, and more are supposedly on their way.

However, surely 1990 is an awful lot of money to pay for what is basically a home computer that's dry, and the arrival of the familiar 64, or around 1990 may make Commodore re-think its pricing strategy.

If it doesn't it's likely to have an expensive failure rate on its hands. One Commodore employee told me that he would definitely buy one when and if they became more readily available, but that is one journalist who definitely won't be buying one! None, if someone were to put me one.

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# Robots knocking on your front door

Christopher Jenkins meets Graham Doubney's mechanical friends



Man in the middle  
Graham Doubney

IMAGINE YOU'RE out for the night, and a visitor (your laptop) is from all your company have. He knocks on the front door and as the sound is dim, there look robot glides from the windows steady avoiding all obstacles between it and the door. The robot hails before the door and speaks in a surprisingly human voice. "Hello, my name is Bob. There's robots in it the moment. Please call back later. Inevitably, should you try to break into the house, I am connected to the longer alarm system, and will telephone the police immediately."

It may sound a fantastic scenario, but the technology is available now. Graham Doubney, at the moment, whose job it is to develop a new a product and commercial firm. As development manager for Prawn Technology, he leads a group which intends to put the art of technology in the hands of the home users.

Prawn has been well known for several years — largely as a distributor of Sinclair equipment, in software merchandise and in the development of modems and other peripherals for domestic and business users. Graham holds what he calls "one of the most interesting and challenging jobs in the business". As head of the development group, his task is to work with the group's hardware and software engineers, and with Prawn's product managers, to refine new ideas into marketable forms. At the moment, he is most excited by a range of robots from the American company Autodesk, which appeal equally to his marketing ideas and his fascination with electronics.

## Path

Graham started in electronic companies making, and in his career at the power of the microprocessor gave he progressed to computers buying one of the first Commodore Pico to be brought into the country. Before his distribution experience and a time as product manager for Atari led to a job as Prawn's software division, and in June 1983 Graham became head of the development group, which he is now engineering. So far has been Prawn's experience that the development group will be moving out of the present East London premises, since the building is too small. Despite the fact that Prawn has only been there for 12 months, this is some indication of the rapid growth of interest in the high technology products which Prawn develops and distributes.

Prawn's latest and most ambitious venture is the development of the robots created by Autodesk of America. Growing from an administrative facility founded by Nolan Bushnell, who built up the Atari empire and sold it to Warner Communications in 1979, Autodesk Pico showed its personal robots at the C 88 show in Chicago last year. The main emphasis was on compatibility with the Apple computer, and the software used was written in Fortran, which allows visitors to be interacted and controlled with simple keyboards making it ideal for the control of robots. The robots were radio controlled at the stage, which disposed of the necessity for training wires, but caused problems with wiring lengths. ■

# Computerama

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**Computerama**

4. **Access and maintenance:** Several companies represent interest in the development and distribution rights for the Audiotek machines, but Proton, with its experience and contacts in software houses, was awarded the contract.

"Our first job," Graham explained, "was to adapt the software for the Commodore 64 Spectrum and BBC computers. Proton has great advantages, but we felt that we should go with those until the products are established on the market. Then hopefully robot owners will become interested in Proton, and we can look again at the possibilities of supplying our software licenses to produce programs on Proton." Much on software for the Commodore 64 should be finished by the time you read this article, and versions for the BBC micro and the Sinclair Spectrum will also be available. Proton is looking at other popular micros since it has no intention of limiting potential sales by restricting the use of the robot to a small selection of micros.

#### Proton

Having said that the simplest of the three Audiotek machines, Fred, doesn't even need a master to control him. Fred stands for Friendly Robot for Educational Driven, and although the name is innocent it seems likely that the name has been chosen so fit in with the company, rather than vice versa? Fred is approximately one foot, stands at around 12 inches tall, an angular bowl-shaped head surmounted by a spherical lens. The casing is formed of tough ABS plastic, and the two wheel drive sprockets incorporated to give accurate movements. At the front of the body is a pen holder assembly which enables Fred to draw patterns. A variety of sensors can be fitted, which enable Fred to detect table edges, to respond to ultrasonic signals. There's also a speech synthesizer with a limited vocabulary in an optional extra.

The control system is quite intricate. Audiotek decided to avoid the complexities of radio control because by changing the room and going for the less difficult infrared control. The first one which uses the infrared commands is a flying saucer shape on a small stand, which, through Fred through a sensor down on his head. The range is about 40 feet, though at good conditions the infrared signal will become beam width and obstructing obstacles. In use too the signals managed to become around an office dividing screen and control a robot 35 feet away on the other side. To make the range of the infrared control system even greater, Proton is developing sub-stations which can be placed in each room of a house, enabling the robot to identify its position and respond to commands from anywhere in the house.

Fred is unique among the Audioteks, in that he need not be restricted to a computer. He comes complete with a hand, controller and which enables you to use him straight away with no knowledge of computer systems. This is the reason which Proton think will open up a whole new market for microprocessor technology

Graham Douglas sees Fred as appealing to schools for educational purposes, to major concern for basic robotics research, and to those with no interest in robotics as a kind of paper toy which will, he hopes, stimulate their interest in all kinds of future technological products. Fred will cost around £200 and should be available in April, when some prototype work on the £1000 will have been completed.

In the meantime, as should already have seen the middle of the range robot, Topo. Topo (short for topological?) is a different order of machine altogether. Like Fred, Topo has infrared communication to and from the computer, and is constructed of ABS plastic and precision engineered metal components. However, though Fred could be regarded as a highly-developed form of the familiar "robo", Topo is the nothing you've ever seen outside a science fiction movie. Topo stands three feet tall and is driven on two broad independently driven discs which give him great stability and precise movement control. He can be

controlled through the computer or from a touch controller mounted on top of his head. Speed, acceleration and deceleration are variable, and control from a joystick on the computer makes possible "Topo-mani" which has to be seen to be believed?

Perhaps the most impressive aspect of this robot is its speech synthesizer capabilities. Most of us will by now have heard the flat, monotonous speech synthesizers which can be connected to the V.C. 20 or Sinclair Spectrum to give a fair imitation of a British Rail station announcer bawling instructions. Well, you can forget that kind of thing with Topo, the speech is clear and comprehensible, and the specially manufactured speech synthesis chips offer a range of control over pitch, speed and intonation which can make Topo speak more clearly than many human beings.

Although speech here can be received into the computer as a series of phonemes which is the system adopted by many current speech synthesizers, Topo's system features a direct 100-40 speech converter

The Topo are coming soon! Fred at right (left is right too)



which allows the user to type plain English into the keyboard and get conversing words stream away. Words can be changed from a high falsetto to a growling roar, and can even be varied within a phrase, so that Typo can be programmed to sing in a way which is guaranteed to make you fall asleep with laughter as fast hearing. A pseudo-random pitch change can be introduced into the speech to give interest to each sentence, and, discoveringly, human mispronunciations such as 'miff' and 'through' can be reproduced. Speech strings are stored in a buffer of up to 1,760 characters and can be released at one time with a simple command "Go on." Needless to say, with a little effort Typo can be persuaded to speak in any language, and Pream hopes to offer a speech recognition unit which will make such use even more obvious possible.

On occasion, Typo announces itself with "Three Typo Typo Typo — hello!" and emits a loud beep if there are any problems with the internal communications

system. This signal can, accommodate 2M computer elements and since each Typo need only utilize seven channels, the possibilities for control of even peripherals are enormous. Already it's possible to control 16 Typos from one console, either independently or as groups.

Pream's main concern is that the robot should be completely expandable in different basic units, thus making available optional add-ons. Pream hopes to let people enter a robot system to their own requirements leaving open the possibility of further expansion. Graham Duxbury explains: "We want to make the robot totally 'open ended.' We call the add-on growth units, because we think that that is a new field and it should have its own vocabulary features such as binary variables, addresses, and related devices, manipulative arms, and so on, are being developed at the moment, and we're rethinking them from the bottom up. For instance, our approach to the manipulative arm will be quite different to anyone else's

— we think there are better ways to design it than having it on the human arm."

An armed 11.5M, Typo will be an introduction to robotics which should open up a whole new field for many users. "The robot is the ultimate puppet!" exclaims Graham says "but it's a whole lot more than that."

The top of the Anaheim stage is where we came in, with Bob — "Bones On Board!" — who waits to be available in the country until a good deal more development work has been done. His superficial resemblance to Typo will be matched by the addition of a four-wheel drive system, a wide range of sensors, and a huge memory capacity of up to three megabytes. The two onboard microprocessors will regulate the user's control to the extent of a command terminal, all the real work will be done by Bob. Speech recognition, speech synthesis and a range of sensors will be standard, and again there will be a large range of "growth units" available to expand the system. The basic model Bob-AM will come first, and more developed units later, but prices haven't yet been fixed. Bob will be able to map a room, and subsequently find his way around a clearly object with a variety of sensors, and manipulate them precisely.

This is all done with a small sample of the kind of capabilities Bob will have — "It's perfectly possible," Graham says, "that Bob will be able to react to the sound of a telephone, go into the hallway to pick it up, hang the set into the living room, hand the receiver to the nearest person, then wait until the call is finished and take the telephone back. Or, with his Anaheim-like, he could come to the shops with a pre-programmed list of purchases and dash around opening the doors by their bar codes, fill up the wagon and roll home. Applications in the fields of security, medical assistance and more, are unlimited. It's just a matter of making the robot available, and then everyone will find their own applications for them, just as they have done with the microcomputer."

#### Plans

Pream's plans for the future include a number of projects which, undoubtedly, Graham was reluctant to discuss at this early stage. "Let's just say that there's a great deal to be done in the home robotics field here. I can see the growth of shops specializing in robots — in the same way that computer shops have developed — and we've got ideas in the field of communications, holography, and computer peripherals as various means of development. I suppose what we're aiming for is the 'soft house' — eventually, domestic systems will all be controlled from a flat screen monitor and a number of terminals."

With the Anaheim machines being controlled through conventional video codes rather than through computer protocols, it may not be long before there's a robot in every house. As Graham says: "We are at the very forefront in a field which has greater potential than the home computer!" ■







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Berkshire SL1 4BG. Or telephone (0753) 79292

 **commodore**

# Acting a bit out of character

Using your custom-designed character set — Kevin Burgin

FORWARDLY as long as Commodore has been involved in the micro industry it has produced machines which have had some graphics facilities. In the beginning there was the Pet and then we have the Vic 20 and the C64 64.

Both the 64 and the Vic have graphics which are available straight from the keyboard as the same way the alphabets is used. To place the graphics characters on the screen from the keyboard you simply press either the left or the lower key and the symbol appears.

All of the characters (alphabets, numeric, graphics) and controls are accessible to the user from the keyboard and from memory. The graphics built into the Vic and the 64 may be PC-coded into the custom using the correct codes. The standard graphics are there, not what is desired. The user can set up his own characters, or indeed a complete custom character set.

There are some basic principles to be considered when using custom characters. To get the Vic or the 64 to recognise a new character set the memory pointers to the characters set must be altered. It is therefore advisable to use all or part of the character set from ROM as a set of RAM. This will enable the user to redefine some of the characters and still use the 64 or Vic character set at the same time.

Two program listings follow, one for the Vic and one for the 64. This article does not explain the design of characters. There are many books that do this adequately. Both

of the listings are about the same length and do much the same thing as principle. Although it is easy to see the difference for each machine. The listings were printed on an Apple II+ 80 and the control characters have been stripped and replaced with the following shorthand:

```
CLR      SHIFT+CLR
CD       CU+5000 5000H
CR       CU+5000 5000H
CU       CU+5000 5000H
CL       CU+5000 5000H
ROMB     CLR
WHT      W+0000
BK       BK+0000
BLU      BLU+0000
```

The program should be saved before it is RUN as any modification in the first stage of the program may be fatal. There is a long pause at first while the new characters are set up. Line 90 points a pointer message and line 20 loads the 64 into upper case. Line 80 and 40 load the memory is reserved and then program lines converting the new character set. Line 90 turns off the keyboard interrupt, to prevent the user altering the program when the character generator is available on. Line 60 character is the character position.

The loop from line 70 to 90 plays the first 1000 (10) characters from the 64's character set into RAM, beginning at location 1000. Line 800 character is the 100 and line 110 turns the keyboard interrupt on. The program for the new characters are used in line 120 and it reads a negative number. The loop from 130 to 160 reads

and ROM's etc, new character data into the locations given as N (D, R, L, M). The data is entered one character at a time through the loop and line 170 returns for the next character until it is exhausted.

The character data for the four characters is at lines 180 to 220. The character loop at line 230 to 260 is really remove all of the unwanted characters in the set now in RAM. Line 270 clears the screen and points a message and line 280 is a delay loop. Line 290 sets the screen and border colours and clears the screen. Line 300 maintains variables. The loop from line 310 to 360 formats and displays the alphabets on the screen. The variable 'N' controls the characters and the variable 'C' controls the colour of the characters. The variable 'W' controls the program to branch to a control to check and change the character colour each time the alphabet has been displayed.

Two other variables are controlled at line 400. The loop from line 410 to 440 points a D above each occurrence of L in the alphabet, 'D' was previously entered from the display to line 320. The screen from line 500 to 540 maintains L, checks to see its value is not equal to 0. The variable 'W' is incremented by 80 before returning from the routine.

## Index a bit

The last part of the course is to display the new character made up of four different characters. This is now quite simple as we have positioned the 64's character in the correct order and the custom set is just the four characters. In altering the value of location 1120 we can make the 64 look at the new character set. This is done at line 110 by changing the value from 20 (normally) to 29. At this point you should be concerned with a number of issues on the screen, if not check your return. Line 560 is a delay loop and line 570 to 600 ends the 64.

The listing for the Vic achieves something very similar although not in quite the same

```
10  REM ***** VIC *****
20  REM ***** 64 *****
30  REM ***** 64 *****
40  REM ***** 64 *****
50  REM ***** 64 *****
60  REM ***** 64 *****
70  REM ***** 64 *****
80  REM ***** 64 *****
90  REM ***** 64 *****
100 REM ***** 64 *****
110 REM ***** 64 *****
120 REM ***** 64 *****
130 REM ***** 64 *****
140 REM ***** 64 *****
150 REM ***** 64 *****
160 REM ***** 64 *****
170 REM ***** 64 *****
180 REM ***** 64 *****
190 REM ***** 64 *****
200 REM ***** 64 *****
210 REM ***** 64 *****
220 REM ***** 64 *****
230 REM ***** 64 *****
240 REM ***** 64 *****
250 REM ***** 64 *****
260 REM ***** 64 *****
270 REM ***** 64 *****
280 REM ***** 64 *****
290 REM ***** 64 *****
300 REM ***** 64 *****
310 REM ***** 64 *****
320 REM ***** 64 *****
330 REM ***** 64 *****
340 REM ***** 64 *****
350 REM ***** 64 *****
360 REM ***** 64 *****
370 REM ***** 64 *****
380 REM ***** 64 *****
390 REM ***** 64 *****
400 REM ***** 64 *****
410 REM ***** 64 *****
420 REM ***** 64 *****
430 REM ***** 64 *****
440 REM ***** 64 *****
450 REM ***** 64 *****
460 REM ***** 64 *****
470 REM ***** 64 *****
480 REM ***** 64 *****
490 REM ***** 64 *****
500 REM ***** 64 *****
510 REM ***** 64 *****
520 REM ***** 64 *****
530 REM ***** 64 *****
540 REM ***** 64 *****
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560 REM ***** 64 *****
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700 REM ***** 64 *****
710 REM ***** 64 *****
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740 REM ***** 64 *****
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760 REM ***** 64 *****
770 REM ***** 64 *****
780 REM ***** 64 *****
790 REM ***** 64 *****
800 REM ***** 64 *****
810 REM ***** 64 *****
820 REM ***** 64 *****
830 REM ***** 64 *****
840 REM ***** 64 *****
850 REM ***** 64 *****
860 REM ***** 64 *****
870 REM ***** 64 *****
880 REM ***** 64 *****
890 REM ***** 64 *****
900 REM ***** 64 *****
910 REM ***** 64 *****
920 REM ***** 64 *****
930 REM ***** 64 *****
940 REM ***** 64 *****
950 REM ***** 64 *****
960 REM ***** 64 *****
970 REM ***** 64 *****
980 REM ***** 64 *****
990 REM ***** 64 *****
1000 REM ***** 64 *****
```

```
10  REM ***** VIC *****
20  REM ***** 64 *****
30  REM ***** 64 *****
40  REM ***** 64 *****
50  REM ***** 64 *****
60  REM ***** 64 *****
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910 REM ***** 64 *****
920 REM ***** 64 *****
930 REM ***** 64 *****
940 REM ***** 64 *****
950 REM ***** 64 *****
960 REM ***** 64 *****
970 REM ***** 64 *****
980 REM ***** 64 *****
990 REM ***** 64 *****
1000 REM ***** 64 *****
```



```

10 F0R5=5,F0R1 C0N=0,F0R05=1,N0T C0N=0
20 F0R1 F1,F0R0 F0R1 F1,F
30 F0R5=6879,42
40 G0T0D100
50 G0T0F000
60 C0=7600
70 C0=26400
80 C0=0
90 F0R4=C0T0C0+2,2+2,F0R C4,C1
100 C0=C0+1
110 IFC0=5 T0R0C0=C0+1
120 IFC0=7 T0R0C0=0
130 N0XT
140 G0T0D10
150 F0R4=7160T07677
160 F0R C4,C1N0T1
170 F0R1=1T04
180 R0400
190 F0R1=8T07
200 R0400
210 F0R C4+3,1
220 N0TJ,1
230 R0T0R0
240 DATAF014,24,24,24,24,60,516,250,250
250 DATA7604,10,21,21,63,63,21,21,10
260 DATA7670,250,250,250,250,250,250,250,100
270 DATA7640,240,240,240,250,250,240,240,240
280 F0R0 F1C0R104H1C0N0C0 C4H400 0N,...."
290 F0R026007,200
300 F0R0 F1C0R104H0R0 0 A T4H1
310 F0R0 F1C0R104H0R0000 F0R0 F1C0R104 C4R0
320 1 AND 1"
330 F0R0 F1C0R104 C4R10"
340 F0R0 F1C0R104 C4R11"
350 F0R0 F1C0R104 C4R10"
360 F0R0 F1C0R104 C4R11"
370 F0R0 F1C0R104 C4R10"
380 F0R0 F1C0R104 C4R11"
390 F0R0 F1C0R104 C4R11"
400 R0T0R0
410 F0R0=8T0C1
420 F0R0 83600,4
430 F0R0=1T0100,N0T1
440 N0T1
450 F0R4=2T0100T0T0F-1
460 F0R0 03600,4
470 F0R0=1T0100,N0T1
480 N0T1
490 F0R4=8T0101
500 F0R0 83600,4
510 F0R0=1T0100,N0T1
520 N0T1
530 F0R4=101T000T0T0F-1
540 F0R0 03600,4
550 F0R0=1T0100,N0T1
560 N0T1
570 F0R0=1T01000,N0T1
580 F0R0 836,29 F0R0 836,29 F0R0
590 F0R0 8367,240 F0R0 F0R0 F0R0 F0R0
600 F0R0 8367,7,7
610 C40

```

way. Again the character, not the mail, allows a different cost. The character, not printed on the same surface, thus needed.

The program first finds the maximum in percent, the new character, this is done by using 50 to 20. Line 30 sets the lower and border colors to red. Line 40 branches to the routine to set up the characters, and line 50 branches to a subprogram to place the characters on the screen. Lines 60, 70 and 80 modify these variables. The loop from line 90 to 130 picks a different character color and each character color is used 100 times. Line 140 ends the program.

The loop from 150 to 160 inserts into the system of memory that has been reserved for the current characters. The loop starting at line 170 controls the insertion of the characters as they are pulled into the loop starting at line 190 until the character number. Line 210 PEEKs for characters into the memory (A=char, B=location) Lines 240 to 250 control the effects we desire.

The screen is cleared and a message printed at line 300. At this point the decrementing reader will notice that although line 300 should have been printed in reverse, it was not. This is because the VCR is fixed to go to E20M for any reversed characters, and that's not the VCR's business on manual. At the bottom of line 290 change the pointer to the program character set. The VCR is now looking at the part of memory starting at location 7445. Lines 300 to 310 print some information, and 320 to 360 print one reversed character on the screen — in this case four 70's.

The rest of the Vic program has little to do with random characters, and a lot more to do with screen "writing." This is fairly simple, but effective on the Vic. It means the relevant regions of the Vic chip are always on the screen around continuously. In fact the whole screen will wrap around. In essence, this is used for scrolling on 640x480 characters and 1024x1024 pixels.

1000

Lines 440 to 449 move the `score` incrementally with a `do-while` loop (moving down to least 500). The loop is `min=490 to 480` (not the reverse), but `break` the `score` counted. The loop from 490 to 500 moves the `score` variable from `map` to `bottom`, and the loop from 500 to 509 does the reverse, leaving the `score` counted. Line 450 is a `do-while` loop and lines 460 to 469 count the `Yes`.

That's just about all the new storage left a cloning goodie for the 64. If you are using machine code and need some more room, the following program will create a another 1K of RAM.

```

        LDA    R0
        AND    #MPE
        STA    R0
        RTS

and back to normal
        LDA    R0
        ORA    #A50
        STA    R0
        RTS

```

This basic work is not possible from home, as the machines will double the alterations to locations I said will not be done. ■

# MR CHIP SOFTWARE

## VIC 20 GAMES AND UTILITIES

### JACKPOT

This is the ultimate Fruit Machine for the VIC with major, hold and re-spin. ROM's machine code. "Overall Jackpot is a beautifully written translation giving superb graphics, messages and use of colour in fact, the program makes Commodore's Fruit Machine cartridge look embarrassingly cheap and easy. Home Computers Weekly No 20 (197/10) £5.00

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DEALER ENQUIRIES WELCOME

# Looking for some logical answers

Boris Allen delves into the bases of machine code

THE BASIC language implemented on both the Vse 28 and the 64 is, in fact, old BASIC 2 for Commodore. It is a very old version of the language and is the same as that on many of the PET and C64 machines.

For this reason, though the following explanation may have been tried out on a lot, all the programs will work on the Vse. The difference between the Vse and 64 is all at the hardware, not in the language. In hardware terms there is a quantum leap forward from the Vse to the 64. This is due to the extended features of the 64: the user has to deal with using PEEKs and POKEs to control the machine's special features.

This means that if a program has been written for the Vse, and the program does not use PEEKs and POKEs, then that program will work on the 64. For example, there is no change to the BASIC for the 64 to give us more set of commands to manipulate memory. Spares are a special feature controlled by setting bits within bytes.

The key to controlling spares on the Vse and 64 is the understanding of logical operations, and how logical operations can be used to control the action flow. To understand how logical operations work, you require an appreciation of binary arithmetic.

The rules for addition of two long digit binary numbers are very simple as shown:

0	0	1	1	Bit A
0	1	0	1	Bit B
00	01	01	00	Result

And this column list on the left in column 0

```
0: PROGRAM 0
10: INPUT "BIT A: "
20: INPUT "BIT B: "
30: SUBROUTINE EQUATIONS
40: CARRY=0:RESULT=0:FOR I=0 TO 15:
50: RESULT= (CARRY + SUM)
60: PRINT RESULT:GOTO 1: RESULT
```

0: PROGRAM 1

10

20

```
30: SUBROUTINE (BIT A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z)
```

```
40: CARRY=0:FOR I=0 TO 15: CARRY= (CARRY + SUM)
```

50

60

END: INPUT: LINE# 10: IN PROGRAM 1

is the answer list that on the right. Call the result in column 0 the SUM for, and then produce the pattern

SUM OPERATOR (Column 0)

Bit A	Bit B	Result
0	0	0
0	1	1
1	0	1
1	1	0

We now call the result in column 1 on the left the CARRY bit, and then we can produce a new pattern:

CARRY OPERATOR (Column 1)

Bit A	Bit B	Result
0	0	0
0	1	0
1	0	0
1	1	1

We know therefore that if we add 0 and 1 the result is the CARRY bit, then the SUM bit that is 0.

If the two numbers are 00 and 01, then SUM and CARRY can be calculated by program 1 with the RESULT being output as CARRY + SUM. The program simply inputs Bit A and Bit B separately and calculates the SUM and the CARRY in binary.

If the table for the SUM OPERATOR is examined it is called a Truth Table (this is a table that when the two bits are equal, then the sum bit is 0. When the two bits differ in value, then the sum bit is 1. In program 1 a check is made to see if the two bits are the same, or  $A=B$ . If the two bits are the same, the result of the equality check is

"true" and the numerical value of truth is 1.

If the two bits are the same then  $A=B$  is equal to 1=1 that is 0. The operator XOR takes the number 0 and returns a number between 0 and 1. If A and B are not the same then XOR is equal to 1. We have performed one of the addition of binary numbers, the use of a logical comparison.

When we look at the truth table for CARRY OPERATOR it is clear that the result is equal to the value of Bit A multiplied by the value of Bit B. The line to produce the CARRY result calculates the wrong version of the product of the numerical value.

Here is another truth table AND OPERATOR

Bit A	Bit B	Result
0	0	0
0	1	0
1	0	0
1	1	1

that for the AND operator provided with line 2. It does not take much studying to realise that the AND and the CARRY operations are identical, so line 40 could be written:

```
40: CARRY = (CARRY + (A AND B))
```

When the only values we have the SETS and VALS is because we are not dealing with numbers, but with characters the characters "1" and "0".

This we know (so far) turned an addition into a comparison (which is addition and a logical operation: the comparison can be changed to:

IS SUM = SUBTRACTIVE? This is a question in which there is no answer. We can program however further to compare addition and subtraction.

This is a logical operation called the "exclusive or" or XOR, or sometimes XOR.

XOR OPERATOR

Bit A	Bit B	Result
0	0	0
0	1	1
1	0	1
1	1	0

which is (more or less) equal to "not equal". The truth table for XOR can be produced by combining AND, OR and NOT, logical operations, and the combined result is:

$A \oplus B = (A \text{ OR } B) \text{ AND } \text{NOT}(A \text{ OR } B)$

so that line 40 then becomes:

```
40: SUM = (CARRY + (A OR B) AND NOT(A OR B))
```

The modified, logical operations only, program is given as program 2.

Line 40 uses the OR logical operation and the truth table for OR is:

Bit A	Bit B	Result
0	0	0
0	1	1

Continued on page 12

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And it is fairly obvious that if all the 1's were turned to 0's (and vice versa) the OR truth table would be the same as that for AND. To change from 1 to 0, and vice versa, we use NOT. We have discovered that

**A AND B is equal to NOT(NOT(A) OR NOT(B))**

and

**A OR B is equal to NOT(NOT(A) AND NOT(B))**

which are formal logic, and known as de Morgan's Theorems. To check the truth of the theorems you could construct a not on your computer, using AND, OR, and NOT.

On a computer, at the level of machine operations, arithmetic is performed by use of logical operations and not by use of arithmetic. Within the 6800-6810 processor, there are logic "gates" which are themselves, devices with circuitry which can be displayed in a truth table. Whereas, with a truth table, there are 1's and 0's, the logic gates, with high and low voltages.

Adding a bit on our apparently straightforward process. Let B0, B5 have eight elements for it is a vector of eight

numbers. We will suppose that B0(B) is an eight bit byte. If bit 0 is that on the right, this is the element B0(B), and bit 7 is shown as B7(B). The intermediate carry bit will be shown as IC, and we will attempt to add a bit value (0 or 1) to the binary number contained in the vector B1. Finally, if the number "overflow" eight bits, then the overflow is placed in C (the final carry bit).

Assume that we already have the number stored in B1, and that we are just now through adding our data bit to B1. We have either 0 or 1 in the intermediate carry, bit IC, and the next bit in B1 to be considered is bit 1 (position). We can calculate the new value of IC, by use of the AND operation, and the OR value of B1(B) by use of the NOT operation, this is

**NIC = B1(B) AND IC**  
**B1(B) = NOT(B1(B) AND IC) AND (B1(B) OR IC)**

**IC = NIC**  
where NIC is used as a temporary variable to hold the new value of IC.

Program 1 shows how the program to add one bit value to a number could be constructed. The value we add to the eight bit number in IC, almost is, if the value was a carry from some other important addition.

The calculation of NIC, B1(B), and IC are as above, and then there is the IF

statement. Now, if the carry in IC is equal to zero, then none of the final bits, in the number will be affected. There is no need for the loop to continue to the loop counter is set to 7, and thus the loop ends. The final carry is stored in the carry, bit (C).

This program illustrates what is sometimes known as a "ripple carry" for many processors. It would be rather tedious if it were possible to add two eight bit numbers, in adding one bit value at the left position the 8's is rather limited.

Now on to adding bytes. Think what we have to do when we add two eight bit numbers. We have to start in the right, and add the rightmost for the 8's of our first byte (B0) to the rightmost (bit 7) of B1. When this bit value has been added, we move to bit 1 on B1 and add that bit value to B1 — starting at bit 1 of B1. Then we move to bit 2 and so forth.

Program 2 performs this addition, one byte at a time. We have to input both B1 and B2, and then we step through the bits for B2. This is the loop with counter J, and the first action in the loop is to set the carry variable carry to the Jth bit of B2.

The next loop adds IC to the byte B1, and it exactly the same to the loop in program 1, with one alteration. The addition now starts from bit position 0 and not bit 0. It would be rather silly to calculate adding at bit 0 of B1 each time, regardless as we are adding on bit 1 of B2 to IC = B1(B).

The new addition comes after the loop. Instead of output the last intermediate carry (IC) to C, there is the more complex

$$C = IC, B1(C)$$

because if IC is zero, but C is already equal to one, then we do not need to change the value in C from one to zero. By examination of the OR truth table, it can be seen that if value IC, or C is equal to one, the result of the OR operation must be one.

The final B1 is almost like the accumulation in the 6800-6810. One can add to it and the value stored there is altered. The byte B2 is like a memory, because it is not altered by the operations.

The machine code instructions in ADD, which means "Add memory to accumulator with carry", and the C variable is equivalent to the machine code "carry" flag (also known as C).

What we have managed to do is to use nothing but logical operations to perform arithmetic. Though we have only added, we can easily subtract if we use negative numbers, also can, multiplication, multiply and add. Multiplication is nothing, more than shifting bits, and adding, and though division is somewhat more complex, it is possible.

The importance behind this realization is that the 6800-6810 can only use logical operations like logic, AND, OR, and what we have performed so far is just what happens, all the time in the microprocessors, when the 64 or 768 bit up add memory.

Microprocessors are nothing more than logic, machines, and an understanding of logic helps a great deal in the programming of machine code programs. ■

```

PROGRAM 1
10 FOR I=0 TO 7 STEP 1: PRINT BIT (CHARACTER B1(B) AND I)
20 INPUT PROMPT "ADD " : IC
30 FOR J=0 TO 7
40 NIC=B1(B) AND IC
50 B1(B)=NOT(B1(B) AND IC) AND (B1(B) OR IC)
60 IC=NIC
70 NEXT J
80 PRINT
90 FOR I=0 TO 7 STEP 1: PRINT BIT (B1(B) AND I)
100 PRINT PROMPT "ADD " : IC
110
12 PROGRAM 2
130 FOR I=0 TO 7: INPUT
140 PRINT "B2"
150 FOR J=0 TO 7 STEP 1: PRINT BIT (CHARACTER B2(B) AND J)
160 FOR K=0 TO 7
170 NIC=B1(B) AND IC
180 B1(B)=NOT(B1(B) AND IC) AND (B1(B) OR IC)
190 IC=NIC
200 NEXT J
210 FOR I=0 TO 7 STEP 1: PRINT BIT (B1(B) AND I)
220 PRINT PROMPT "ADD " : IC

```



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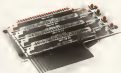
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**Medicines used in the Community for Rheumatoid Arthritis**  
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**Abstract**

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| <input type="checkbox"/> Community at 200-299 seats             | <input type="checkbox"/> Business Applications at 100-199 seats              |
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```

20 R=1471 S=1494 FOR I=1 TO 1888 NEXT
30 POKER.81 POKER.81 POKER.81 POKER.81
40 GET#1:IF#="2" THEN R=R-1 P=-1 GOTO88
50 IF#="X" THEN R=R+1 P=1 GOTO88
60 IF#="C" THEN R=R+48 P=48 GOTO88
70 IF#="F" THEN R=R-48 P=-48 GOTO88
80 R=R+P
90 C=PEEK(R):IF C<182 AND C<81 THEN180
100 X=X+1 GOTO5
110 IF#="," THEN S=S+1 S=1 GOTO150
120 IF#="." THEN S=S-1 S=-1 GOTO150
130 IF#=";" THEN S=S+48 S=48 GOTO150
140 IF#="/" THEN S=S-48 S=-48 GOTO150
150 S=S+3
160 C=PEEK(S):IF C<182 AND C<81 THEN 30
170 Z=Z+1 GOTO5
200 PRINT" ANY KEY FOR ANOTHER GAME(RUN STOP KEY TO STOP GAME)!!!"
210 GET#4:IF#="" THEN 218
220 GOTO1

```

Player 1 key

Y = up

X = left

2 = down

3 = up

Player 2 key

Y = up

X = left

2 = down

3 = up

## Vic ditty

From Richard Barton of Euro, a program for the upgraded Vic 20

THIS PROGRAM is written for upgraded VIC 20 and features more advanced music controls such as pitch control using offset values, random note durations and pitches, etc.

This is a small part of a larger computer music project Richard is working on, adapted to its early record of Computer

music, which was published in the 1980's by Ball Telephone Laboratories using a main-frame computer. The Vic 20 can equal its performance very well, apart from the lack of notes available.

### Program notes

Most the screen display uses cursor left controls at the beginning of each printed line.

50 contains the note pitches.

120, 140, 160, 180, 200, 220 is establish the notes in its state changed format to alter the chords.

240 to 290 contain the actual melody

data arrays.

500 to 100 contain the randomised instructions for the pitch offsets which are X, Y and Z.

120 to 100 contain the randomised instructions for the note durations.

140 onwards are instructions for the final "ENDMEL" in the piece.

VARIABLE M is the screen display note index.

VARIABLES C, G, and M are the note duration variables.

VARIABLES X, Y, and Z are the offset values which is incremented onto the pitches of notes 51, 52 and 53.

```

10 REM VIC DITTY.
20 REM RANDOMISED BRETON, 1983.
30 REM Z, Y & C ARE OFFSETS TO PITCHES.
40 REM C, G & M ARE NOTE DURATIONS.
50 S1=36876 S2=36875 S3=36876 POKER36876.6 N=1
60 PRINT"#####VIC DITTY"
70 PRINT""
80 FOR#=1TO2
90 PRINT"#####PITCH & TIME"
100 C=250 G=100 M=200 S=150 X=0 Y=0 Z=0 GOSUB240 N=#+1
110 PRINT"#####VOICES INTERCHANGES"
120 S1=36876 S2=36875 S3=36874 GOSUB240 N=#+1
130 PRINT"#####PITCH VALUES +1"
140 S1=36875 S2=36876 S3=36874 N=1 Y=1 Z=1 GOSUB240 N=#+1
150 PRINT"#####PITCH VALUES +1"
160 S1=36876 S2=36874 S3=36875 G=1 Y=1 Z=1 GOSUB240 N=#+1
170 PRINT"#####PITCH VALUES +2"
180 S1=36875 S2=36874 S3=36876 X=2 Y=2 Z=2 GOSUB240 N=#+1
190 PRINT"#####PITCH INC. RANDOM"
200 GOSUB300 S1=36874 S2=36875 S3=36876 GOSUB240 N=#+1
210 PRINT"#####PITCH+TIME RANDOM"
220 GOSUB300 S1=36875 S2=36874 S3=36876 GOSUB320 GOSUB240 N=#+1
230 ME=TR GOTO340
240 POKER32,215+Y:FOR#=1TO2 NE=T POKER33,225+Y:FOR#=1TO2 NEXT
250 POKER13 R POKER32 200+Z:FOR#=1TO2 NEXT POKER33 220:FOR#=1TO2 NEXT POKER33.8
260 POKER32 281+Z:FOR#=1TO2 NEXT POKER33 280:FOR#=1TO2 NEXT POKER32,131+Y:POKER31.17
270 G=4
280 POKER33,126+Y:FOR#=1TO2 NEXT POKER33,175:FOR#=1TO2 NEXT POKER33 183:FOR#=1TO2 N
290 EXT
290 POKER33,131+X:FOR#=1TO2 NE=T:POKER33,155+Z:POKER32,159+Y:POKER31,135+X:FOR#=1TO2

```

Continued on page 41

```

00 NEXT
200 POKES2,B POKES2,B POKES3,B RETURN
300 X=INT(RND*(1#28)) Y=INT(RND*(1#28)) Z=INT(RND*(1#28))
310 RETURN
320 C=INT(RND*(1#400))+60 G=INT(RND*(1#100))+60 M=INT(RND*(1#600))+60
330 RETURN
340 S1=36874 S2=36875 S3=36876 M=M+1
350 PRINT"MFH'S RANDOM PITCHES"
360 FORB=1TO8
370 A=INT(RND*(1#8171)+120
380 POKES1,M FORT=1TO28 NEXT POKES2,X=5 FORT=1TO66 NEXT POKES3,W=18 FORT=1TO26 X
END
390 POKES1,B FORT=1TO288 NEXT POKES1,B POKES2,B POKES3,B NEXT M=M+1
400 PRINT"MFH'S QND CHORUS"
410 POKES1,205 POKES2,145 FORB=1TO28 POKES3,169 FORT=1TO28 NEXT POKES3,176 FORT
=1TO28
420 NEXT NEXT POKES3,169 FORT=1TO1888 NEXT
430 POKES1,B POKES2,B POKES3,B
440 PRINT"BB REPEAT? -HIT Y OR N B"
450 GETB IFB$="Y" THEN GOTO 450
460 IFB$="Y" THEN GOTO 460
470 IFB$="Y" THEN PRINT"C" END
480 GOTO 450

```

## Repeat

From *Mark Baker of Phoenix, for the Commodore 64*

THE PROGRAM is written in Basic, but sets an off up to a machine code routine when it has been run. It is located at 0040-HEX (003 Decimals)

The routine makes use of two of the random keys. If F1 is pressed repeat is available on all the keys but if F3 is pressed

the keyboard returns to normal.

If a Repeat is carried out the routine will not work. To get back into the routine SYSG32 must be typed in.

There are two listings: one in Basic for use without an assembler and one for use with an assembler.

```

0 8340 78 SEI
1 8341 A01480 LDA 48314
2 8344 802E03 STA 4832E
3 8347 A01583 LDA 48315
4 8349 802F03 STA 4832F
5 834D A059 LDA 4459
6 834F 801483 STA 48314
7 8352 A983 LDA 4483
8 8354 801583 STA 48315
9 8357 58 CL1
10 8358 68 RTS
11 8359 A0C5 LDA 4C5
12 835B C084 CMP 4484
13 835D F087 BEQ 48386
14 835F C085 CMP 4485
15 8361 F088 BEQ 4838E
16 8363 8C2E03 JMP (4832E)
17 8366 A088 LDA 4488
18 8368 808A02 STA 4828A
19 836B 8C2E03 JMP (4832E)
20 836E A088 LDA 4488
21 8370 808A02 STA 4828A
22 8373 8C2E03 JMP (4832E)
18 REM *****
28 REM * REPEAT *
38 REM * FCJ 1984 *
48 REM *****
50 REM
80 FORA=832TO886:READ0:POKEA,B:NEXT
90 SYS832
100 DATA128,173,20,3,141,46,3,173
110 DATA21,3,141,47,3,169,69,141
120 DATA28,3,189,3,141,21,3,88
130 DATA98,185,197,201,4,248,7,201
140 DATA5,248,11,189,46,3,189,128
150 DATA141,138,2,189,46,3,189,8
160 DATA141,138,2,189,46,3,32

```

Left: with assembler

Right: without assembler

## Gobbler

James Thurman, *Washington* — Nov. 20, 1955

**Table 1**

**IN THEIR CLAMP**, you are a man and you have to eat the diamonds to get to 500 points in three minutes. If you don't, a monster comes searching for you. But if you do, it means more diamonds and more...

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You get U for up, L for left, R for right and D for down. You get 10 points for each charmed but you don't get any points if you get the charmed with your hands. *Back to Top*

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# Turtle power

From *DW Robotics and Sensors for the Commodore Computer* by John Allwright

IF YOU COME across an inverted soap bowl wandering about and perhaps drawing steps on a line that's off paper, you have met a Turtle. There is no average here to go into the construction of turtle systems, instead the principles of the turtle serve as a good means for putting a pair of subject matters to rest.

The turtle is a simple "blackboard" system composed by two independent wheels on a diameter. Half bearings or shafts form the mechanical base and all topology. To move straight ahead, both wheels rotate in step. To turn is the opposite: one wheel rotates forward while the other rotates backward to exactly the same rate. If one wheel runs in exactly twice the speed of the other, the turtle will follow a circle with center one wheel space from the slower wheel. Accurate movement calls for the motor base drive units, one per step — just the job for stepper motors.

At the center of a "turtle" turtle is a remarkable part, so that its preambulations can be used to draw shapes, to even graphs and illustrations. Let us think about this problem later.

## Top down

Two stepper motors can be driven with little complication from the right bits of the user's port. With the aid of two multi-Steppermotors chips plus the experience of the article in December's *Commodore* Magazine, the task of making the motor-cases should go fairly trouble-free or phone copy of the previous article can be obtained by sending a stamped, addressed envelope to this magazine. The more difficult part is to make the software "steppermotors" so that a command program can be based on the desired movements of the turtle without going into the gory details of the number of motor steps required for each gesture. Taking a "top down" look at the problem, we wish to be able to type "advance, 100" or move 100 mm forward or perhaps "turn clockwise, 90". Codes could be used to add, subtract, "twice clockwise, 200, 90" giving 90 degrees of a 200 mm radius circle. It might be even be "open the eye" to add "Circus acrobats in blind car" values to numbers — how can you do this? Well, graphs, to name the further commands "pen, up" and "pen, down" complete the set. The task of working out where the turtle would wind up after a go at movement can be performed on the command sequence by number substitution, if needed, although mechanical tolerances

mean that the results will not be particularly accurate after a lengthy preambulation.

The suggested stepper motors are type 100T, made by Philips and distributed by Impey of Kent Road, Epsom, Surrey at a price around £12.00. They have 40 steps per rev or 12 electrical revolutions per mechanical revolution. If you drive the motor at half steps at 4V, 5V, 6V, 8V, 10V, 12V, you will move 80 half steps per revolution of the wheel. Suppose that your wheels are 80 mm in diameter, then they will have a circumference of around 250 mm and each half step will give you a movement of about 3.1 mm. If you don't mind making or removing your own wheels, this is a number of 1796/rev for 1 mm will give about 3.1 mm per half step — that you would be best to fix the motor steps into from the motor chips and accept a slightly odd scale factor.

When the motors are driven equally in opposite directions, the turtle rotates about its center. If each wheel makes one revolution then the turtle will turn through 180 degrees of wheel/revolution of wheel/revolution. Make the revolutions two and a half times the diameter and each step will now give one degree. If the motors are driven in different speeds, the distance advanced will be given by the average of the signed number of steps while the turtle will turn through an angle equal to half their difference.

## Clay's ideas

The "clayton" can be made from plywood or even balsa wood. Just a few bits work to do. The disk can be fixed from lightweight expanded ball bearings, although a couple of feet (paper) will really serve the purpose. They should just clear the ground, so that only one number is ground at a time. Most of the work should have to be due to the universal wheels, and this must be connected to the axle at a high speed gear. If you remember some sort of plastic bowl to make a cover then the cable can safely emerge from a hole in the center. If, however, your turtle is naked you should move a gear in the center — not too tall, or the turtle will topple. The cable should approach the

axle from above, dropping below a support ring strong attached to the center.

As first sight you will need a 4-line display controllers on the cable line for each motor, two for a pen line plus more for sensors and steps to add later. To a pen line you can get away with two bits, sharing a common positive power line, but this may be a little economy since the resistance of the cable can cause coupling between the motor drives. Robotic cables in the center solution, but for less the cheapest.

## Further steps

For data make up an "align line" for connecting the commands over demanded motor half steps. From now on, let us call them just steps as follows. Let us assume a wheel diameter of 80 mm and a step rate of 2 1796 = 1792 steps.

Command	Left motor steps	Right motor steps
Advance 1	distance 1	distance 1
Turn on	+ angle	+ angle
Turn off	- angle	- angle
Circle on	angle <sup>2</sup>	angle <sup>2</sup>
Circle off	(distance 1) - 1	(distance 1) - 1
Circle on	angle <sup>2</sup>	angle <sup>2</sup>
Circle off	(distance 1) - 1	(distance 1) - 1

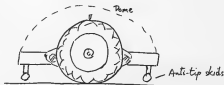
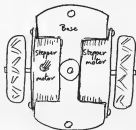
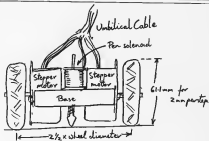
Now the command sequence may read "turn on" a motor control module, which will accept commands in the form of the number of steps each motor must move. At every command, "step 20" can adjust a given variable which would then feature in the system. Let us use a sub routine to calculate the results, and let us assume that we have 1000 commands.

Turning the speed of a single motor can be done with a single variable delay, but to drive two motors at different speeds, we have a different concept, the binary rate multiplier. Suppose that the left motor must move 100 steps, while the right motor must move only 67. Then we find a number that the sum of the two is then 167. Each time round the loop we step the left motor but the right motor only as this can be done in step. We make the division we keep adding the ratio to another variable T, say 17. A new number than the number is stepped and T is reduced by 1. Finally, continue? Then 167 is an example.

Left motor position	T	Right motor position
Step 0	0	
Step 1	17	
Step 2	1.14	
Step 3	1.18	Step 1
Step 4	1.41	2
Step 5	1.15	Step 1
Step 6	1.15	Step 1
Step 7	1.15	Step 1
Step 8	1.15	Step 1
Step 9	1.15	Step 1
Step 10	1.15	Step 1
Step 11	1.15	Step 1
Step 12	1.15	Step 1
Step 13	1.15	Step 1
Step 14	1.15	Step 1
Step 15	1.15	Step 1
Step 16	1.15	Step 1
Step 17	1.15	Step 1
Step 18	1.15	Step 1
Step 19	1.15	Step 1
Step 20	1.15	Step 1
Step 21	1.15	Step 1
Step 22	1.15	Step 1
Step 23	1.15	Step 1
Step 24	1.15	Step 1
Step 25	1.15	Step 1
Step 26	1.15	Step 1
Step 27	1.15	Step 1
Step 28	1.15	Step 1
Step 29	1.15	Step 1
Step 30	1.15	Step 1
Step 31	1.15	Step 1
Step 32	1.15	Step 1
Step 33	1.15	Step 1
Step 34	1.15	Step 1
Step 35	1.15	Step 1
Step 36	1.15	Step 1
Step 37	1.15	Step 1
Step 38	1.15	Step 1
Step 39	1.15	Step 1
Step 40	1.15	Step 1
Step 41	1.15	Step 1
Step 42	1.15	Step 1
Step 43	1.15	Step 1
Step 44	1.15	Step 1
Step 45	1.15	Step 1
Step 46	1.15	Step 1
Step 47	1.15	Step 1
Step 48	1.15	Step 1
Step 49	1.15	Step 1
Step 50	1.15	Step 1
Step 51	1.15	Step 1
Step 52	1.15	Step 1
Step 53	1.15	Step 1
Step 54	1.15	Step 1
Step 55	1.15	Step 1
Step 56	1.15	Step 1
Step 57	1.15	Step 1
Step 58	1.15	Step 1
Step 59	1.15	Step 1
Step 60	1.15	Step 1
Step 61	1.15	Step 1
Step 62	1.15	Step 1
Step 63	1.15	Step 1
Step 64	1.15	Step 1
Step 65	1.15	Step 1
Step 66	1.15	Step 1
Step 67	1.15	Step 1
Step 68	1.15	Step 1
Step 69	1.15	Step 1
Step 70	1.15	Step 1
Step 71	1.15	Step 1
Step 72	1.15	Step 1
Step 73	1.15	Step 1
Step 74	1.15	Step 1
Step 75	1.15	Step 1
Step 76	1.15	Step 1
Step 77	1.15	Step 1
Step 78	1.15	Step 1
Step 79	1.15	Step 1
Step 80	1.15	Step 1
Step 81	1.15	Step 1
Step 82	1.15	Step 1
Step 83	1.15	Step 1
Step 84	1.15	Step 1
Step 85	1.15	Step 1
Step 86	1.15	Step 1
Step 87	1.15	Step 1
Step 88	1.15	Step 1
Step 89	1.15	Step 1
Step 90	1.15	Step 1
Step 91	1.15	Step 1
Step 92	1.15	Step 1
Step 93	1.15	Step 1
Step 94	1.15	Step 1
Step 95	1.15	Step 1
Step 96	1.15	Step 1
Step 97	1.15	Step 1
Step 98	1.15	Step 1
Step 99	1.15	Step 1
Step 100	1.15	Step 1

So we arrive at the end of the movement with each motor having taken the correct number of steps. This is the principle behind most graph plotting systems for drawing oblique sample lines. The result is slightly improved if 1 mm with the other 0.5 mm, then states the movement to be shared.











## A good look at business

1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 26

If music proved more needed on the value of "junk," organized" business machines being Covid need do not more than turn to a report from the intelligent Electronic groups on Paris, which appeared at the same time at the Las Vegas show. The report emphasizes that European businesses are no longer looking at machines as executive toys — they want solutions to specific problems. *Church's Commentary* has called on the challenge, and will reassemble with the Seattle

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## Graphics and games

On the second screen, have you tried the `print` command (press `2` now) to print supply's? I have checked the calculations in `initiation` and it works ok. Try dropping the program in the `loop` and query the values of the variables. You should get some data from saving in the `array`.

## Back to basics

**New Chemistry Requirements**  
 1999-2000: Undergraduate work in other 4-yr. 200 days, must allow credit limit. Otherwise 4-yr max. Not compressed term students, as follows.

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 to Earth with the Founder  
 — perfect and — average (like  
 programmers in 50% 500%)  
 (or the same effect)

## From Pet to 64

Andreas Jansen  
Janssen  
Hi, there is a program called  
the Pet Simulator available  
[www.f.hpi.de]

Loading  
error

**TIPS:** With the remote dock in the shop and keep the tape-camp at 4. If the tape does not load then your dock may need cleaning and degaussing. If the tape will does, and load then your dock is faulty.

## Star in eclipse

**THE CORPUS.** If you're not typing on a laptop, from books, or creating some other program, it is to copy three programs, before installing, to run them, preferably also each 20 hours (unless). The reason is, that some programs, when run corrupt memory or such a way that you cannot use a second file.

It is often possible that you are not using the right speaker connector type. You can use Shield, composite, tape, or tri-shielded wires from Radio

## A foreign language

**THE CASSETTE**—series from CRM illustrates that in *Scene* part 1 and part 2 and *Using* the old in Print-Forward (published by Macmillan) are good starting points. Initially, you will need a cassette deck (the storage of hard. Lastly, you will have to define your own character set, and the *Programmer's Reference* is Guide Two (the old).

## Copying to disk

The 1941 back up requires about 20 minutes in the dark, and the source disk and destination disk have to be removed and replaced several times over the full amount of time of the disk data on each side of the disk, says the

## Advice for the Vic . . . 1

I HAVE DELIGHTED a Vn. Super Expedient has the instructions by its Loverside. Although I thought that and even I have found some of the feelings. I could not in English copy, as I feel there are some things I'm missing? C. Hubbard  
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## COMPETITION CORNER

Come to the show  
and make music  
with Autographics

*Tony Roberts invites you to the Hell Hook  
music show where you can win Autographics  
Microsound 64 music keyboard*

THE HELL Hook Music Club is holding its first year music show. All the local software suppliers have been asked to come and create tables have been set up around the hall — one per supplier.

Each supplier has set out his software on the table, together with a menu on which the software can be tried and which are several Spectrum and various sorts of Commodore, etc. The layout of the hall is shown in the illustration.

However, the club's owner, Celia Cole, hasn't yet bought her own machine, and so the music is played on many different machines so the club has noticed that she can expect one of each kind of music on show by slipping an equal number of tables between each workstation. On which table did she start, and how many tables did she slip between each start?

Answer the questions

correctly and you stand a chance of winning a Microsound 64 music keyboard from Autographics. The four score keyboard plus, into the 64's cartridge port and offers sound storage and recall for playback or overdubbing.

It is designed to make full use of the 64's sound capabilities, which should make it easy to answer this month's be breaker. Complete the following sentence as fully and originally as possible in less than 11 words: "I want some a Microsound 64, music keyboard because..."

The winner of the competition will be that December/January issue of Club Home at Post Talbot who will be receiving his prize of a disk drive from Commodore. He stated correctly that the joystick belonged to the Spectrum and that the 28 inch TV had been discontinued from the Commodore range.

Send your answers to Competition Corner,  
Commodore Martens, 13-15 Little Manport  
Street, London WC1R 2LS — to arrive no later  
than the last working day in the month on the  
cover of this issue. The name of the winner, and  
the solution to the puzzle, will be published in  
the issue after next. Entries will not be  
acknowledged and we cannot enter into  
correspondence on the result.

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*the name to remember*



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**MARK II** is a full 6502 **16-BIT ASSEMBLER** with the power that professional programmers need, yet so simple to use that we recommend it to beginners. The **MARK II** cartridge has many other facilities including editing commands and a machine language monitor, all for £51.50.

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[illegible]

100



## Cosmological Scenario

There are enough in a random sample of past records. Good police are shaking you from all sides. Koller Ram is always top from the day, and he top things off there's a enormous spider looking in the back ground.



**Abstract**

These objectives will allow managers to:  
 • establish greater control over their own  
 • planning and operational decisions

1997



## Awards of 2000

First object is to connect me  
with intelligent, successful  
businessmen who are helping you  
in your program on your quest  
for the Crystal of Long. Such  
connections will be necessary if you  
are to succeed; this will guide you.

RT 85

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